

Application No. 10/014,937

a superimposor capable of being adjusted to different mounting positions that superimposes each of the intermediate light beams onto the image forming area of the modulator.

2. (Amended) The [projection-type display apparatus] projector of claim 1, further comprising a [reflector] reflecting mirror capable of being adjusted to different mounting angles with respect to an incident optical axis and being provided in the optical path between the light source and the modulator.

3. (Amended) The [projection-type display apparatus] projector of claim 1, further comprising:

a color separating optical system provided between the superimposor and the modulator to separate light output from the superimposor into color light beams;

a plurality of modulators connected with the color separating optical system to produce modulated color light beams;

a color synthesizing optical system that receives the modulated color light beams and outputs enlarged synthesized color light beams which are projected by the projection lens; and

a [reflector] reflecting mirror disposed in an optical path between the color separating optical system and at least one of the plurality of modulators and having an adjustable mounting angle with respect to an incident optical axis.

4. (Amended) The [projection-type display apparatus] projector of claim 3, wherein a mounting angle of the [reflector] reflecting mirror located closest to the modulator is adjustable.

5. (Amended) The [projection-type display apparatus] projector of claim 3, wherein the modulator is a reflection type modulator.

Application No. 10/014,937

6. (Amended) A [projection-type display apparatus] projector comprising:
- a light source that outputs a light beam;
 - a first optical element that splits the light beam output from the light source into a plurality of intermediate light beams;
 - a second optical element including a polarization conversion unit that outputs polarized light beams and a superimposer that superimposes light beams output from the polarization conversion unit, the superimposer having an adjustable mounting position, the second optical element arranged in a vicinity of a position where the intermediate light beams are converged, the second optical element separates the intermediate light beams from the first optical element into a p-polarized light beam and an s-polarized light beam, the second optical element aligns a polarization direction of one of the p-polarized light beam and the s-polarized light beam [with a polarization direction of the other of the p-polarized light beam and the s-polarized light beam], and the second optical element outputs the resulting light beams;
 - a modulator that receives and modulates the light beams emitted from the second optical element; and
 - a projection lens that projects the light beam modulated by the modulator.
7. (Amended) The [projection-type display apparatus] projector of claim 6, further comprising a [reflector] reflecting mirror provided in an optical path between the light source and the modulator, the [reflector] reflecting mirror having an adjustable mounting angle with respect to an incident optical axis.
8. (Amended) The [projection-type display apparatus] projector of claim 6, further comprising:
- a color separating optical system provided between the superimposer and the modulator to separate light output from the superimposer into color light beams;

Application No. 10/014,937

a plurality of modulators connected with the color separating optical system to produce modulated light beams;

a color synthesizing optical system that receives the modulated color light beams and outputs enlarged synthesized color light beams which are projected by the projection lens; and

a [reflector] reflecting mirror disposed in an optical path between the color separating optical system and at least one of the plurality of modulators and having adjustable mounting angle with respect to an incident optical axis.

9. (Amended) The [projection-type display apparatus] projector of claim 8, wherein a mounting angle of the [reflector] reflecting mirror located closest to the modulator is adjustable.

10. (Amended) The [projection-type display apparatus] projector of claim 8, wherein the modulator is a reflection type modulator.

11. (Amended) A [projection-type display apparatus] projector comprising:
a light source that emits a light beam;
a modulator having an image forming area, the modulator modulates the light beam emitted by the light source;
a projection lens that projects the light beam modulated by the modulator [and a projector screen];
an optical element, located in an optical path between the light source and the modulator, the optical element splits the light beam emitted from the light source into a plurality of intermediate light beams;
a superimposer that superimposes each of the intermediate light beams from the optical element onto the image forming area of the modulator; and

Application No. 10/014,937

an adjustment mechanism connected with the superimposor to adjust a mounting position of the superimposor.

12. (Amended) The [projection-type display apparatus] projector of claim 11, further comprising:

a first adjustment mechanism connected with the superimposor to adjust the mounting position of the superimposor in a first direction orthogonal to an optical axis; and

a second adjustment mechanism connected with the superimposor to adjust the mounting position of the superimposor in a second direction orthogonal to the optical axis and the first direction.

13. (Amended) The [projection-type display apparatus] projector of claim 12, wherein the adjustment mechanism comprises:

a base adjustment plate;

a first adjustment plate slidably movable in the first direction relative to the base adjustment plate; and

a second adjustment plate slidably movable in the second direction relative to the first adjustment plate.

14. (Amended) The [projection-type display apparatus] projector of claim 13, wherein the adjustment mechanism comprises a first slip prevention mechanism that prevents the first adjusting plate from slipping in the second direction and a second slip prevention mechanism that prevents the second adjustment plate from slipping in the first direction.

15. (Amended) The [projection-type display apparatus] projector of claim 13, wherein the superimposor is fixed to the second adjustment plate.

16. (Amended) A [projection-type display apparatus] projector comprising:

a light source that outputs a light beam;

Application No. 10/014,937

a first optical element that splits a light beam output from the light source into a plurality of intermediate light beams;

a second optical element including a polarization conversion unit that outputs polarized light beams and a superimposer that superimposes light beams output from the polarization conversion unit, the second optical element arranged in a vicinity of a position where the intermediate light beams are converged, the second optical element separates the intermediate light beams from the first optical element into a p-polarized light beam and an s-polarized light beam, the second optical element aligns a polarization direction of one of a p-polarized light beam and the s-polarized light beam [with a polarization direction of the other of the p-polarized light beam and the s-polarized light beam], and the second optical element outputs the resulting light beams;

a modulator that receives and modulates the light beams emitted from the second optical element;

a projection lens that projects the light beam modulated by the modulator; and

an adjusting mechanism that adjusts a mounting position of the superimposer.

17. (Amended) The [projection-type display apparatus] projector of claim 16, further comprising:

a first adjustment mechanism that adjusts the mounting position of the superimposer in a first direction orthogonal to an optical axis; and

a second adjustment mechanism that adjusts the mounting position of the superimposer in a second direction orthogonal to the optical axis and the first direction.

18. (Amended) The [projection-type display apparatus] projector of claim 17, wherein the adjustment mechanism comprises:

a base adjustment plate;

Application No. 10/014,937

a first adjustment plate slidably movable in the first direction relative to the base adjustment plate; and

a second adjustment plate slidably movable in the second direction relative to the first adjustment plate.

19. (Amended) The [projection-type display apparatus] projector of claim 18, wherein the adjustment mechanism comprises a first slip prevention mechanism that prevents the first adjustment plate from slipping in the second direction and a second slip prevention mechanism that prevents the second adjustment plate from slipping in the first direction.

Please add new claims 20-52 as follows:

20. A projector, comprising:

a light source that emits a light beam;

a modulator having an image forming area, the modulator receives the light beam emitted by the light source and outputs a modulated light beam;

a projection lens that projects the light beam modulated by the modulator;

an optical element, disposed in an optical path between the light source and the modulator, the optical element splits the light beam into a plurality of intermediate light beams;

a superimposer capable of being adjusted to different mounting positions that superimposes each of the intermediate light beams onto the image forming area of the modulator;

a power supply;

an input/output interface circuit;

a video signal processing circuit;

a control circuit that drives and controls the projector; and

Application No. 10/014,937

an outer casing that accommodates the light source, the modulator, the optical element, superimposer, the power supply, the input/output interface circuit, the video signal processing circuit, and the control circuit.

21. The projector of claim 20, further comprising a reflecting mirror capable of being adjusted to different mounting angles with respect to an incident optical axis and being provided in the optical path between the light source and the modulator.

22. The projector of claim 20, further comprising:

a color separating optical system provided between the superimposer and the modulator to separate light output from the superimposer into color light beams;

a plurality of modulators connected with the color separating optical system to produce modulated color light beams;

a color synthesizing optical system that receives the modulated color light beams and outputs enlarged synthesized color light beams which are projected by the projection lens; and

a reflecting mirror disposed in an optical path between the color separating optical system and at least one of the plurality of modulators and having an adjustable mounting angle with respect to an incident optical axis.

23. The projector of claim 22, wherein a mounting angle of the reflecting mirror located closest to the modulator is adjustable.

24. The projector of claim 22, wherein the modulator is a reflection type modulator.

25. A projector, comprising:

a light source that outputs a light beam;

a first optical element that splits the light beam output from the light source into a plurality of intermediate light beams;

Application No. 10/014,937

a second optical element including a polarization conversion unit and a superimposer that superimposes light beams output from the polarization conversion unit, the superimposer having an adjustable mounting position, the second optical element is arranged in a vicinity of a position where the intermediate light beams are converged, the second optical element separates the intermediate light beams from the first optical element into a p-polarized light beam and an s-polarized light beam, the second optical element aligns a polarization direction of one of the p-polarized light beam and the s-polarized light beam, and the second optical element outputs the resulting light beams;

a modulator that receives and modulates the light beam emitted from the second optical element;

a projection lens that projects the light beam modulated by the modulator;

a power supply;

an input/output interface circuit;

a video signal processing circuit;

a control circuit that drives and controls the projector; and

an outer casing that accommodates the light source, the first and second optical elements, the modulator, the power supply, the input/output interface circuit, the video signal processing circuit, and the control circuit.

26. The projector of claim 25, further comprising a reflecting mirror provided in an optical path between the light source and the modulator, the reflecting mirror having an adjustable mounting angle with respect to an incident optical axis.

27. The projector of claim 25, further comprising:

a color separating optical system provided between the superimposer and the modulator to separate light output from the superimposer into color light beams;

Application No. 10/014,937

a plurality of modulators connected with the color separating optical system to produce modulated light beams;

a color synthesizing optical system that receives the modulated color light beams and outputs enlarged synthesized color light beams which are projected by the projection lens; and

a reflecting mirror disposed in an optical path between the color separating optical system and at least one of the plurality of modulators and having adjustable mounting angle with respect to an incident optical axis.

28. The projector of claim 27, wherein a mounting angle of the reflecting mirror located closest to the modulator is adjustable.

29. The projector of claim 27, wherein the modulator is a reflection type modulator.

30. A projector, comprising:

a light source that emits a light beam;

a modulator having an image forming area, the modulator modulates the light beam emitted by the light source;

a projection lens that projects the light beam modulated by the modulator;

an optical element, located in an optical path between the light source and the modulator, the optical element splits the light beam emitted from the light source into a plurality of intermediate light beams;

a superimposer that superimposes each of the intermediate light beams from the optical element onto the image forming area of the modulator;

an adjusting mechanism connected with the superimposer to adjust a mounting position of superimposer;

a power supply;

Application No. 10/014,937

an input/output interface circuit;
a video signal processing circuit;
a control circuit that drives and controls the projector; and
an outer casing that accommodates the light source, the modulator, the optical element, the superimposer, the adjusting mechanism, the power supply, the input/output interface circuit, the video signal processing circuit, and the control circuit.

31. The projector of claim 30, further comprising:

a first adjustment mechanism connected with the superimposer to adjust the mounting position of the superimposer in a first direction orthogonal to an optical axis; and
a second adjustment mechanism connected with the superimposer to adjust the mounting position of the superimposer in a second direction orthogonal to the optical axis and the first direction.

32. The projector of claim 31, wherein the adjustment mechanism comprises:

a base adjustment plate;
a first adjustment plate slidably movable in the first direction relative to the base adjustment plate; and
a second adjustment plate slidably movable in the second direction relative to the first adjustment plate.

33. The projector of claim 32, wherein the adjustment mechanism comprises a first slip prevention mechanism that prevents the first adjusting plate from slipping in the second direction and a second slip prevention mechanism that prevents the second adjustment plate from slipping in the first direction.

34. The projector of claim 32, wherein the superimposer is fixed to the second adjustment plate.

35. A projector, comprising:

Application No. 10/014,937

a light source that outputs a light beam;

a first optical element that splits the light beam output from the light source into a plurality of intermediate light beams;

a second optical element including a polarization conversion unit and a superimposer that superimposes light beams output from the polarization conversion unit, the second optical element is arranged in a vicinity of a position where the intermediate light beams are converged, the second optical element separates each of the intermediate light beams from the first optical element into a p-polarized light beam and an s-polarized light beam, the second optical element aligns a polarization direction of one of the p-polarized light beam and the s-polarized light beam, and the second optical element outputs the resulting light beams;

a modulator that receives and modulates the light beams emitted from the second optical element;

a projection lens that projects the light beam modulated by the modulator;

an adjusting mechanism that adjusts a mounting position of the superimposer;

a power supply;

an input/output interface circuit;

a video signal processing circuit;

a control circuit that drives and controls the projector; and

an outer casing that accommodates the light source, the first and second optical elements, the modulator, the adjusting mechanism, the power supply, the input/output interface circuit, the video signal processing circuit, and the control circuit.

36. The projector of claim 35, further comprising:

a first adjustment mechanism that adjusts the mounting position of the superimposer in a first direction orthogonal to an optical axis; and

Application No. 10/014,937

a second adjustment mechanism that adjusts the mounting position of the superimposer in a second direction orthogonal to the optical axis and the first direction.

37. The projector of claim 36, wherein the adjustment mechanism comprises:

a base adjustment plate;

a first adjustment plate slidably movable in the first direction relative to the base adjustment plate; and

a second adjustment plate slidably movable in the second direction relative to the first adjustment plate.

38. The projector of claim 37, wherein the adjustment mechanism comprises a first slip prevention mechanism that prevents the first adjustment plate from slipping in the second direction and a second slip prevention mechanism that prevents the second adjustment plate from slipping in the first direction.

39. The projector of claim 3, further comprising:

a light guiding system disposed in a longest optical path between the color separating optical system and each of the plurality of modulators, the light guiding system including two lenses and an intermediate lens disposed between the two lenses, a position of the intermediate lens being adjustable.

40. The projector of claim 8, further comprising:

a light guiding system disposed in a longest optical path between the color separating optical system and each of the plurality of modulators, the light guiding system including two lenses and an intermediate lens disposed between the two lenses, a position of the intermediate lens being adjustable.

41. The projector of claim 11, further comprising:

a color separating optical system that separates the light emitted from the superimposer into a plurality of color lights;

Application No. 10/014,937

a plurality of the modulators that each modulates the color light separated by the color separating optical system;

a light guiding system disposed in a longest optical path between the color separating optical system and each of the plurality of modulators, the light guiding system including two lenses and an intermediate lens disposed between the two lenses; and

a further adjusting mechanism that adjusts a position of the intermediate lens.

42. The projector of claim 16, further comprising:

a color separating optical system that separates the light emitted from the superimposer into a plurality of color lights;

a plurality of the modulators that each modulates the color light separated by the color separating optical system;

a light guiding system disposed in a longest optical path between the color separating optical system and each of the plurality of modulators, the light guiding system including two lenses and an intermediate lens disposed between the two lenses; and

a further adjusting mechanism that adjusts a position of the intermediate lens.

43. The projector of claim 22, further comprising:

a light guiding system disposed in a longest optical path between the color separating optical system and each of the plurality of modulators, the light guiding system including two lenses and an intermediate lens disposed between the two lenses, a position of the intermediate lens being adjustable.

44. The projector of claim 27, further comprising:

a light guiding system disposed in a longest optical path between the color separating optical system and each of the plurality of modulators, the light guiding system including two lenses and an intermediate lens disposed between the two lenses, a position of the intermediate lens being adjustable.

45. The projector of claim 30, further comprising:

a color separating optical system that separates the light emitted from the superimposer into a plurality of color lights;

a plurality of the modulators that each modulates the color light separated by the color separating optical system;

a light guiding system disposed in a longest optical path between the color separating optical system and each of the plurality of modulators, the light guiding system including two lenses and an intermediate lens disposed between the two lenses; and

a further adjusting mechanism that adjusts a position of the intermediate lens.

46. The projector of claim 35, further comprising:

a color separating optical system that separates the light emitted from the superimposer into a plurality of color lights;

a plurality of the modulators that each modulates the color light separated by the color separating optical system;

a light guiding system disposed in a longest optical path between the color separating optical system and each of the plurality of modulators, the light guiding system including two lenses and an intermediate lens disposed between the two lenses; and

a further adjusting mechanism that adjusts a position of the intermediate lens.

47. A method for manufacturing a projector that includes:

a light source that emits a light beam;

a modulator having an image forming area, the modulator receives the light beam emitted by the light source and outputs a modulated light beam;

a projection lens that projects the light beam modulated by the modulator;

Application No. 10/014,937

an optical element, disposed in an optical path between the light source and the modulator, the optical element splits the light beam into a plurality of intermediate light beams; and

a superimposor that superimposes each of the intermediate light beams onto the image forming area of the modulator,

the method comprising:

adjusting a mounting position of the superimposor; and

fixing the superimposor after adjusting the mounting position.

48. The method for manufacturing the projector of claim 47, the projector further including:

a color separating optical system provided between the superimposor and the modulator to separate light output from the superimposor into color light beams;

a plurality of modulators connected with the color separating optical system to produce modulated color light beams;

a color synthesizing optical system that receives the modulated color light beams and outputs enlarged synthesized color light beams which are projected by the projection lens; and

a reflecting mirror disposed in an optical path between the color separating optical system and at least one of the plurality of modulators,

the method further comprising:

adjusting a mounting angle of the reflecting mirror with respect to an incident optical axis; and

fixing the reflecting mirror after adjusting the mounting angle.

49. The method for manufacturing the projector of claim 48, the projector further including:

Application No. 10/014,937

a light guiding system disposed in a longest optical path between the color separating optical system and each of the plurality of modulators, the light guiding system including two lenses and an intermediate lens disposed between the two lenses,

the method further comprising:

adjusting a mounting a position of the intermediate lens; and

fixing the intermediate lens after adjusting the mounting position.

50. A method for manufacturing a projector that includes:

a light source that outputs a light beam;

a first optical element that splits the light beam output from the light source into a plurality of intermediate light beams;

a second optical element including a polarization conversion unit that outputs polarized light beams and a superimposer that superimposes light beams output from the polarization conversion unit, the second optical element arranged in a vicinity of a position where the intermediate light beams are converged, the second optical element separates the intermediate light beams from the first optical element into a p-polarized light beam and an s-polarized light beam, the second optical element aligns a polarization direction of one of the p-polarized light beam and the s-polarized light beam, and the second optical element outputs the resulting light beams;

a modulator that receives and modulates the light beam emitted from the second optical element; and

a projection lens that projects the light beam modulated by the modulator;

the method comprising:

adjusting a mounting position of the superimposer; and

fixing the superimposer after adjusting the mounting position.

51. The method for manufacturing the projector of claim 50, the projector further including:

a color separating optical system provided between the superimposor and the modulator to separate light output from the superimposor into color light beams;

a plurality of modulators connected with the color separating optical system to produce modulated light beams;

a color synthesizing optical system that receives the modulated color light beams and outputs enlarged synthesized color light beams which are projected by the projection lens; and

a reflecting mirror disposed in an optical path between the color separating optical system and at least one of the plurality of modulators,

the method further comprising:

adjusting a mounting angle of the reflecting mirror with respect to an incident optical axis; and

fixing the reflecting mirror after adjusting the mounting angle.

52. The method for manufacturing the projector of claim 51, the projector further including:

a light guiding system disposed in a longest optical path between the color separating optical system and each of the plurality of modulators, the light guiding system including two lenses and an intermediate lens disposed between the two lenses,

the method further comprising:

adjusting a mounting position of the intermediate lens; and

fixing the intermediate lens after adjusting the mounting position.

REMARKS

Claims 1-52 are pending in this application.